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Title: PM_{2.5} Technology Assessment and Characterization Study in New York State (PMTACS-NY)

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Institution: Atmospheric Sciences Research Center, University at Albany

Cost Sharing Partners: New York State Energy Research and Development Authority (NYSERDA) and New York State Department of Environmental Conservation (NYSDEC)

Research Category: Particulate Matter EPA "Supersites" Program

Sorting Code: 99-NCERQA-X1

Project Period: July – September 2002

Objective of Research:

As a result of recent clinical and epidemiological studies (NRC, 1998) associating adverse health effects in humans and fine particle mass, a new National Ambient Air Quality Standard for PM_{2.5} mass (15 µg/m³ annual and 65 µg/m³ 24-hr average) has been promulgated in the United States (Federal Register, 1997). Significant scientific and technical issues surrounding the mitigation of the warm season PM_{2.5}/co-pollutant complex and its interdependence with O₃ air quality through coupled photochemical pathways, common precursors, and similar dependencies upon meteorology must be addressed if effective control strategies are to be implemented.

The long-term monitoring of the PM_{2.5}/co-pollutant complex and its precursors at urban and regional representative sites provides the opportunity to track the impact of emission controls and their effectiveness on air quality. These data can be used to verify that implemented PM_{2.5} primary and secondary precursor (including ozone precursor) emission controls are performing according to specifications and verify that PM_{2.5} and ozone air quality has responded to the emission changes achieved as expected. Without adequate monitoring systems to track the progress and effectiveness of implemented control programs, the air quality management approach remains unaccountable.

The PMTACS-NY Supersite program provides a unique and unparalleled opportunity to enhance our understanding of ozone/PM_{2.5}-precursor relationships and track progress in current precursor emission control programs and assess their effectiveness in achieving expected air quality responses. The impact of this research is highly significant, providing a sound scientific basis for informed effective decisions in the management of air quality in New York and will benefit its citizens both environmentally and economically.

The PMTACS-NY is designed around three major objectives and addresses a series of science policy relevant questions related to hypotheses to be tested using measurement data collected

under the program. The subject quarterly reports provide highlights on the overall program status, the progress made in the context of the specific tasks associated with the three program objectives, identification of outstanding issues, project schedule and completion status by task, and a budget analysis.

Progress Summary/Accomplishments:

The reduction of the PMTACS-NY 2001 measurement data set is now complete and has been submitted to the NARSTO Permanent Data Archive. The only exception being the BNL SPLAT (single particle laser ablation technique) data set, which remains outstanding. Discussions with Dan Imre indicate that SPLAT data reduction is tedious and extremely time consuming. His group has been developing data reduction software specifically designed to streamline the processing of the SPLAT data. He indicated that this software should be available by the end of the year. In the meantime, I have asked that he deliver the raw data archive to our data manager.

During this quarter most of our time was dedicated to the execution of our 2002 summer mini-intensive at Whiteface Mountain. Logistical support (i.e. installation of instrument shelters and additional power for research instrumentation) for the measurement operations at Whiteface Mountain began in early June. The intensive measurement campaign operated at the Lodge level of Whiteface Mountain. The measurement site is located on a cleared embankment on the side of the Whiteface Mountain at 44° 23' N, 73° 51' W at an elevation 600m. The site is host for routine NYSDEC air quality and acid deposition measurements carried out in cooperation with ASRC scientists as well as a National Acid Deposition NTN site. A picture of site layout is shown below.



A schematic of the placement and systems deployed during the summer intensive are presented in Figure 1. Measurements officially began on July 10 and operated through August 10. Overall, the bulk of measurement campaign was associated with relatively clean summer background conditions with a few regional transport pollution events. We will provide preliminary data characterizing the overall air quality conditions during the campaign in the next quarterly report.

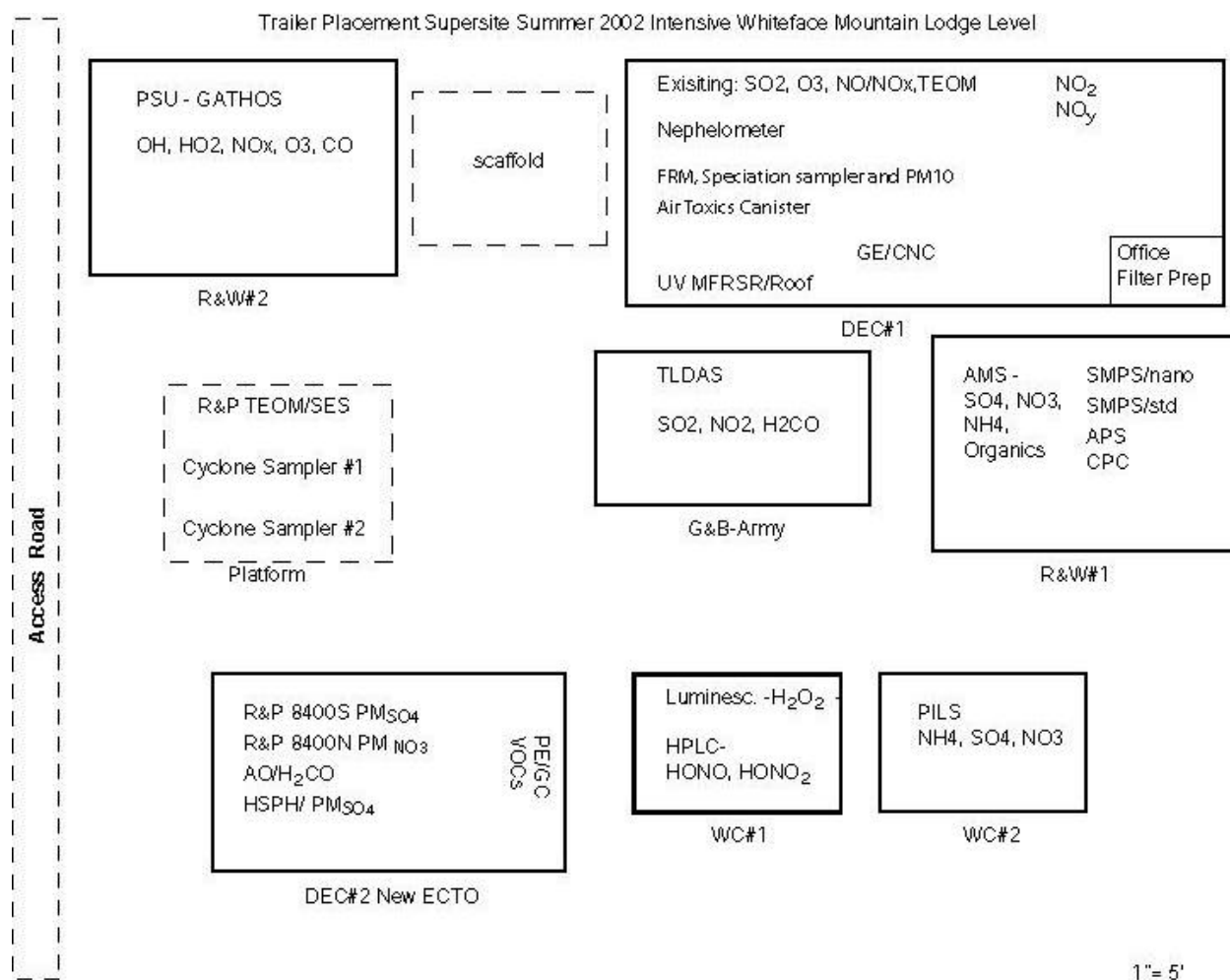


Figure 1. Instrumentation deployment and placement at Whiteface Marble Mountain (Lodge Level)

Objective I. Measure the temporal and spatial distribution of the PM_{2.5}/co-Pollutant complex including: SO₂, CO, VOCs/Air Toxics, NO, NO₂, O₃, NO_y, H₂CO, HNO₃, HONO, PM_{2.5} (mass, SO₄⁻, NO₃⁻, OC, EC, Trace Elements), single particle aerosol composition, CN, OH and HO₂ to support regulatory requirements to develop cost effective mitigation strategies PM_{2.5} and its co-pollutants and to establish trends in the relevant precursor concentrations to assess the impact of recent and future emission reductions in terms of emission control effectiveness and air quality response.

Measurements at our two rural sites Whiteface Mountain and Pinnacle State Park operated during the quarter as outlined in Table 1 of the QAPP, with the obvious exception of the summer intensive period at Whiteface Mountain as outlined above. Our urban sites, IS 52 in the South Bronx and PS219 in Queens also operate monitoring equipment outline in Table 1 of the QAPP.

Objective II. Monitor the effectiveness of new emission control technologies [i.e. Compressed Natural Gas (CNG) bus deployment and Continuously Regenerating Technology (CRT)] introduced in New York City and its impact on ambient air quality, thorough remote open path roadside, mobile platform, and fixed site measurements of CO₂, CO, NO, H₂CO, HONO, CN and aerosol chemical composition.

There are no new results to report on regarding this objective.

Objective III. Test and evaluate new measurement technologies and provide tech-transfer of demonstrated operationally robust technologies for network operation in support of the development of process science and observation based analysis tools and health based exposure assessments.

Intercomparison studies of several PM semi-continuous measurement technologies were carried out as part of the 2002 summer mini-intensive at Whiteface Mountain. These comparisons were to mirror those performed during the 2001 summer intensive at Queens College, NY. The performance testing and intercomparison of these systems under high urban pollution and clean regional background conditions, is essential if we are to understand the limits of detection and the environmental and compositional sensitivities of the instrument systems.

Publications/Presentations: There were no publications/presentations during this quarter.

Future Activities and Outstanding Issues: During the next quarter planned activities include: 1) initiate data reduction of Whiteface Mountain Summer 2002 Field Intensive data set; 2) preparation and participation in 21st Annual AAAR Conference, Oct 7-11, 2002, Charlotte, NC; 3) preparation and participation in Air & Waste Management Association, Symposium on Air Quality Measurement Methods and Technology—2002 November 13-15, 2002 San Francisco, CA; 4) preparation and participation in the American Geophysical Union 2002 Fall Meeting, 6-10 December 2002, San Francisco, CA; and 5) preparation and submission of draft manuscripts on Summer 2001 Supersite results to Aerosol Science and Technology and Atmospheric Environment.

Supplemental Keywords: ambient air, atmospheric aerosols, ozone, particulate matter, metals, nitrogen oxides, sulfates, organics, atmospheric chemistry, monitoring, measurement methods, northeast air quality.

Relevant Web Sites: <http://www.asrc.cestm.albany.edu/pmtacsny/>